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1. UNDERGROUND SOURCES OF DRINKING WATER

This Attachment was prepared in support of Excelsior Mining Arizona, Inc.'s (Excelsior's) Underground Injection Control (UIC) Permit application to the United States Environmental Protection Agency (USEPA). Excelsior is applying for an area Class III UIC permit to install a wellfield for in-situ recovery (ISR) of copper at the Gunnison Copper Project (Project), located in Cochise County, Arizona.

This attachment includes maps and cross sections that depict the vertical limits of underground sources of drinking water (USDWs) within the Area of Review (AOR) as defined in Attachment A of this UIC application. Figure D-1 shows the surficial geology of the Project area, Figure D-2 shows the bedrock surface geology, and figures D-3, D-4, and D-5 are cross sections through the AOR that show USDWs, the injection formation, and the direction of water movement.

The USDW within the AOR is saturated, fractured Paleozoic bedrock in the oxide zone. Basin fill (alluvium) above bedrock is not a USDW because the basin fill does not meet the definition of a USDW according to Chapter 40 of the Code of Federal Regulations §144.3. Only thin, isolated occurrences of saturated basin fill occur within the proposed AOR; thus, it does not contain a "sufficient quantity of groundwater to supply a public water system." Additional discussion regarding the degree of saturated basin fill is provided in Attachment S of this UIC application.

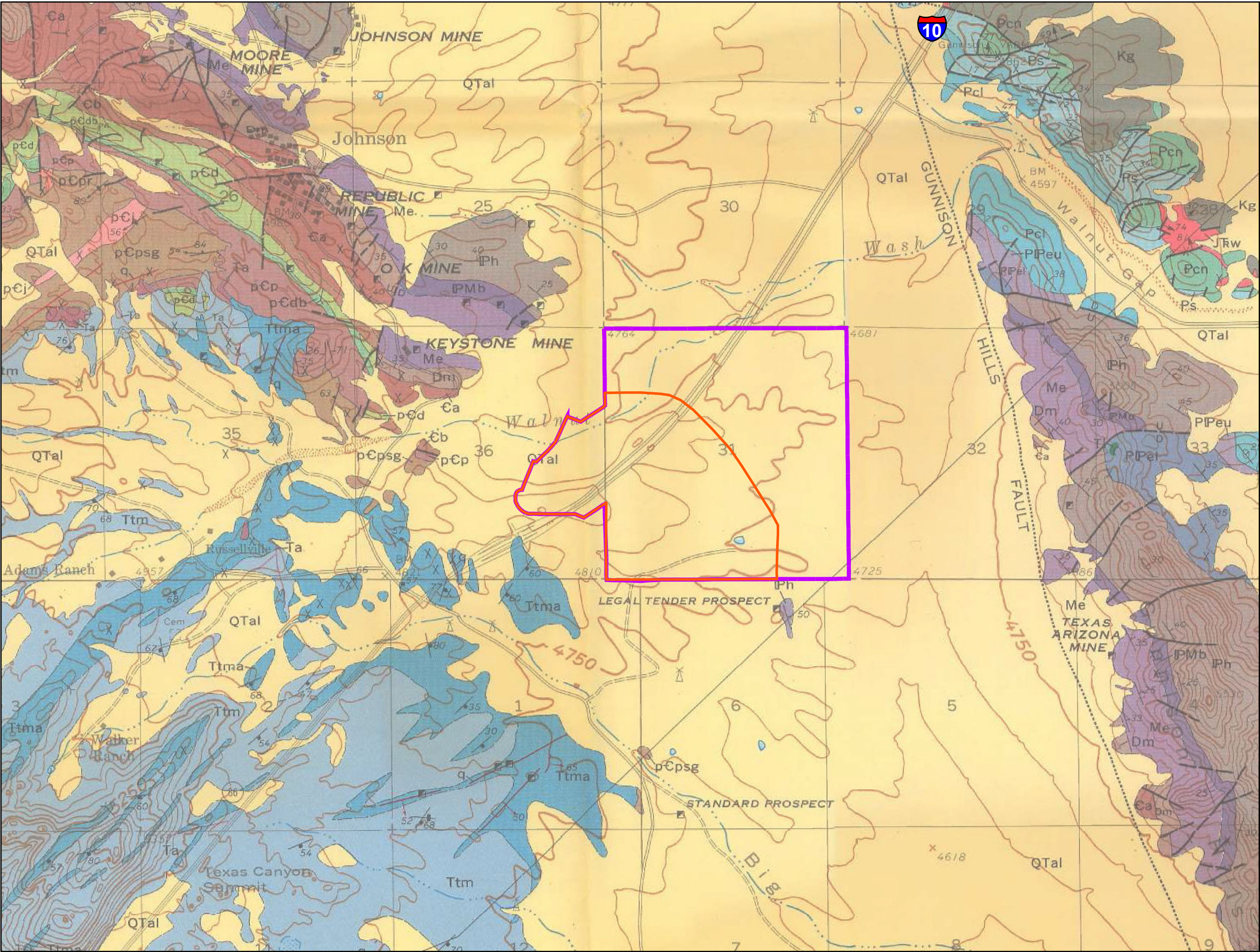
The deeper bedrock (sulfide zone) is not a USDW for the following reasons:

- Two aquifer tests conducted in the sulfide zone (wells NSH-014B and NSH-025) indicated hydraulic conductivity values of 0.01 ft/day and 0.07 feet/day (Attachment A-3).
- Fracture intensity is lower in the sulfide zone than in the oxide zone (Attachment A-2).
- Beryllium and fluoride exceeded the maximum contaminant level and Aquifer Water Quality Standard for beryllium and fluoride in 2015 (as discussed in Attachment H).

The vertical extent of the oxide zone will be further refined during drilling of the injection/recovery, hydraulic control, and observation wells in the AOR.

The Tertiary Texas Canyon Quartz Monzonite (shown on Figure D-5) is also not a USDW, based on the hydraulic properties of the unit, as described in Attachment A-2.

Additional information regarding the regional geologic setting, orogenic history, and geologic formations is provided in Attachment F of this UIC Application.



- Legend**
- Gunnison Copper Project
 - Area of Review
 - QTal - Quaternary Alluvium (Basin Fill)
 - Ttm - Texas Canyon Quartz Monzonite
 - Ttma - Texas Canyon Quartz Monzonite (altered phase)
 - jTrw - Walnut Gap Volcanics
 - Pcn - Concha Limestone
 - Ps - Scherrer Formation
 - Pcl - Colina Limestone
 - IPpe - Earp Formation (IPeu, IPel)
 - IPh - Horquilla Limestone
 - IPmb - Black Prince Limestone
 - Me - Escabrosa Limestone
 - Dm - Martin Formation
 - Ca - Abrigo
 - Cb - Bolsa Quartzite
 - pCd - Dripping Springs Quartzite (Apache Group)
 - pCp - Pioneer Shale (Apache Group)
 - pCpsg - Pinal Schist

Geology reprinted from
Cooper and Silver (1964)

0 1,000 2,000 4,000
Feet

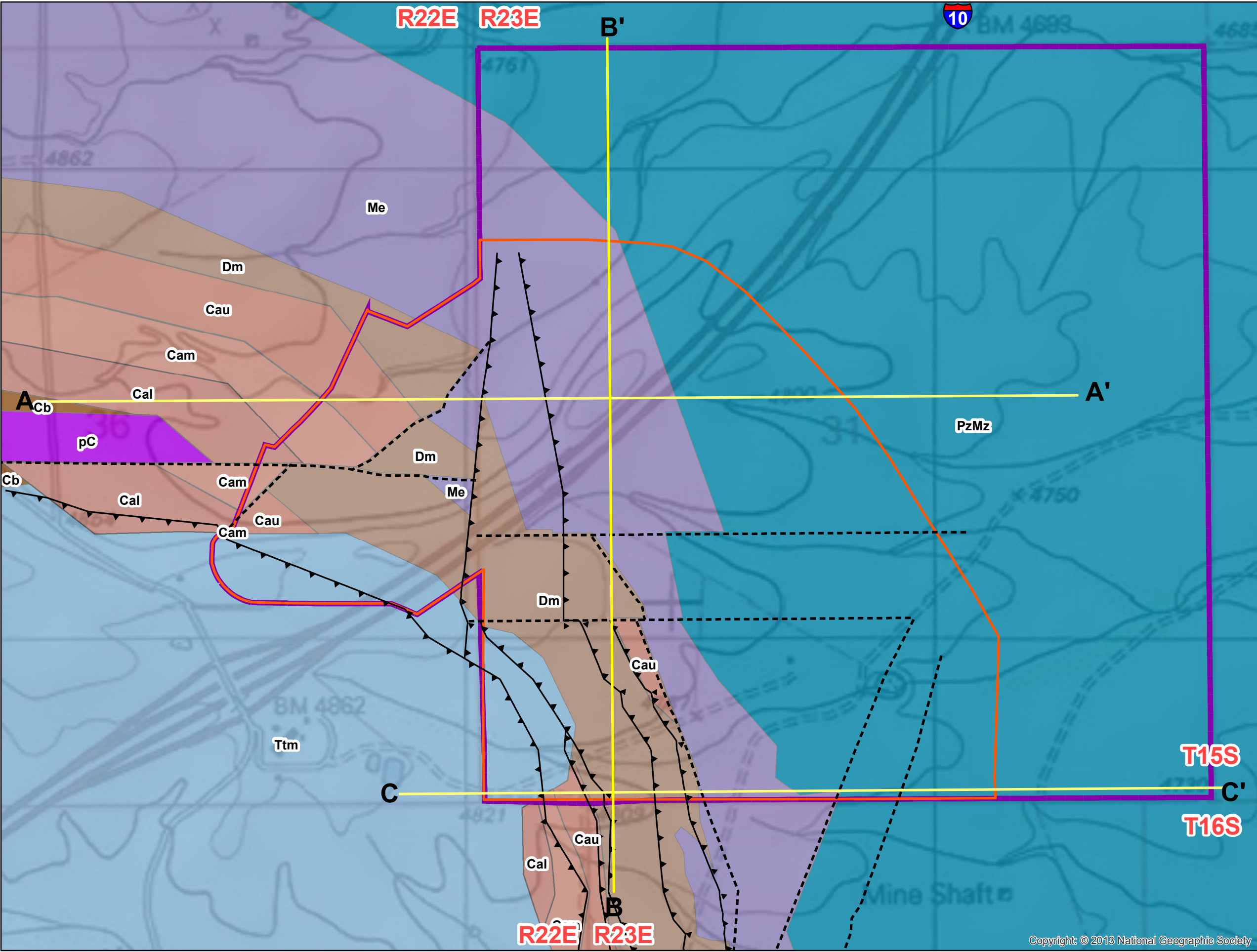
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FIGURE D-1
Surficial Geologic Map



Legend

- Gunnison Copper Project
- Area of Review
- Cross Section Line
- Normal or Vertical Fault
- Thrust Fault
- Ttm - Texas Canyon Quartz Monzonite
- Me - Escabrosa Limestone
- Dm - Martin Formation
- Pz/Mz - Mesozoic/Paleozoic Undivided
- Cal - Upper Abrigo
- Cam - Middle Abrigo Formation
- Cal - Lower Abrigo
- Cb - Bolsa Quartzite
- pC - PreCambrian Undivided

Source: Excelsior Geologic Model

03507001,400

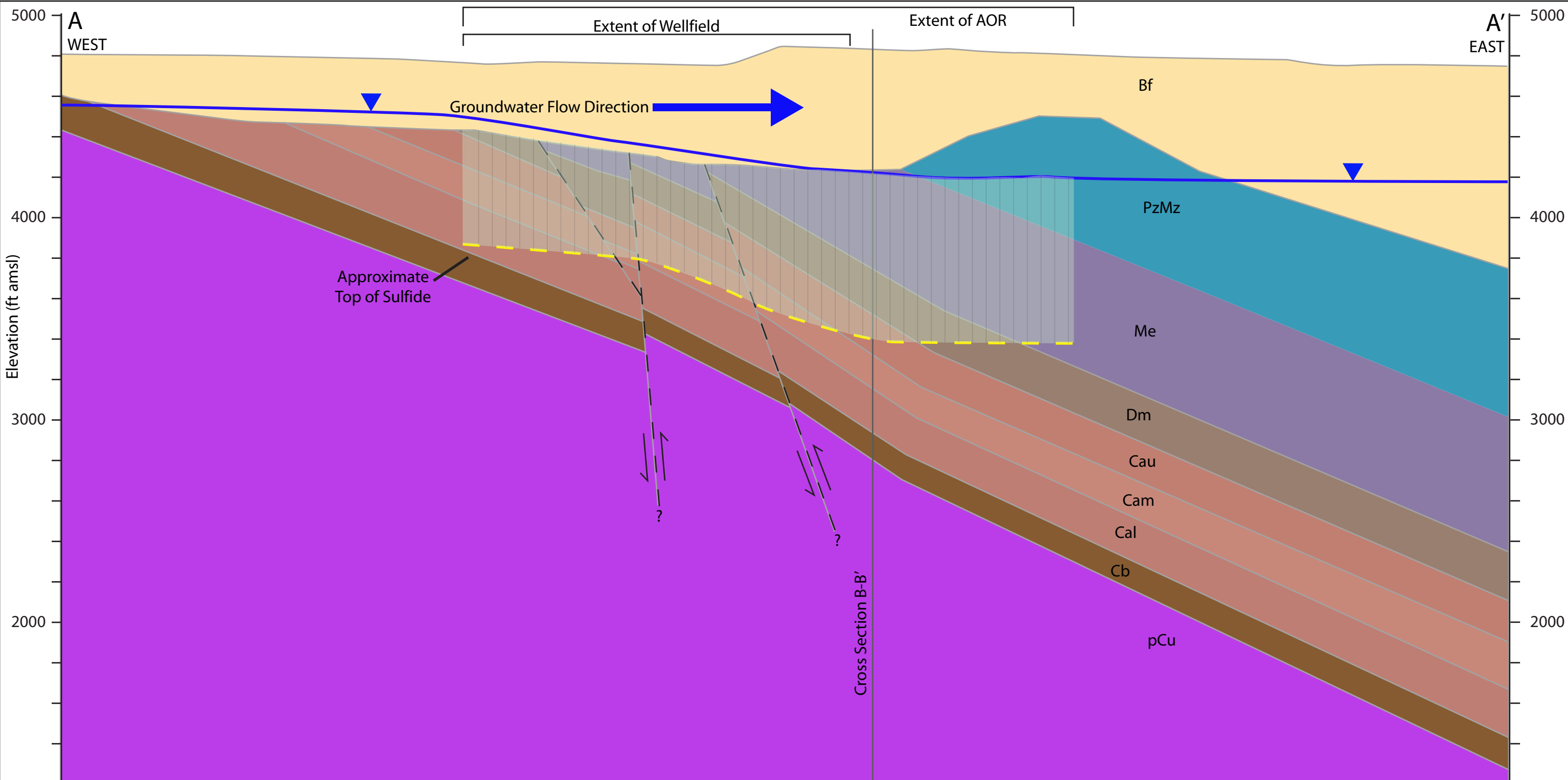
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FIGURE D-2
Bedrock Surface
Geologic Map

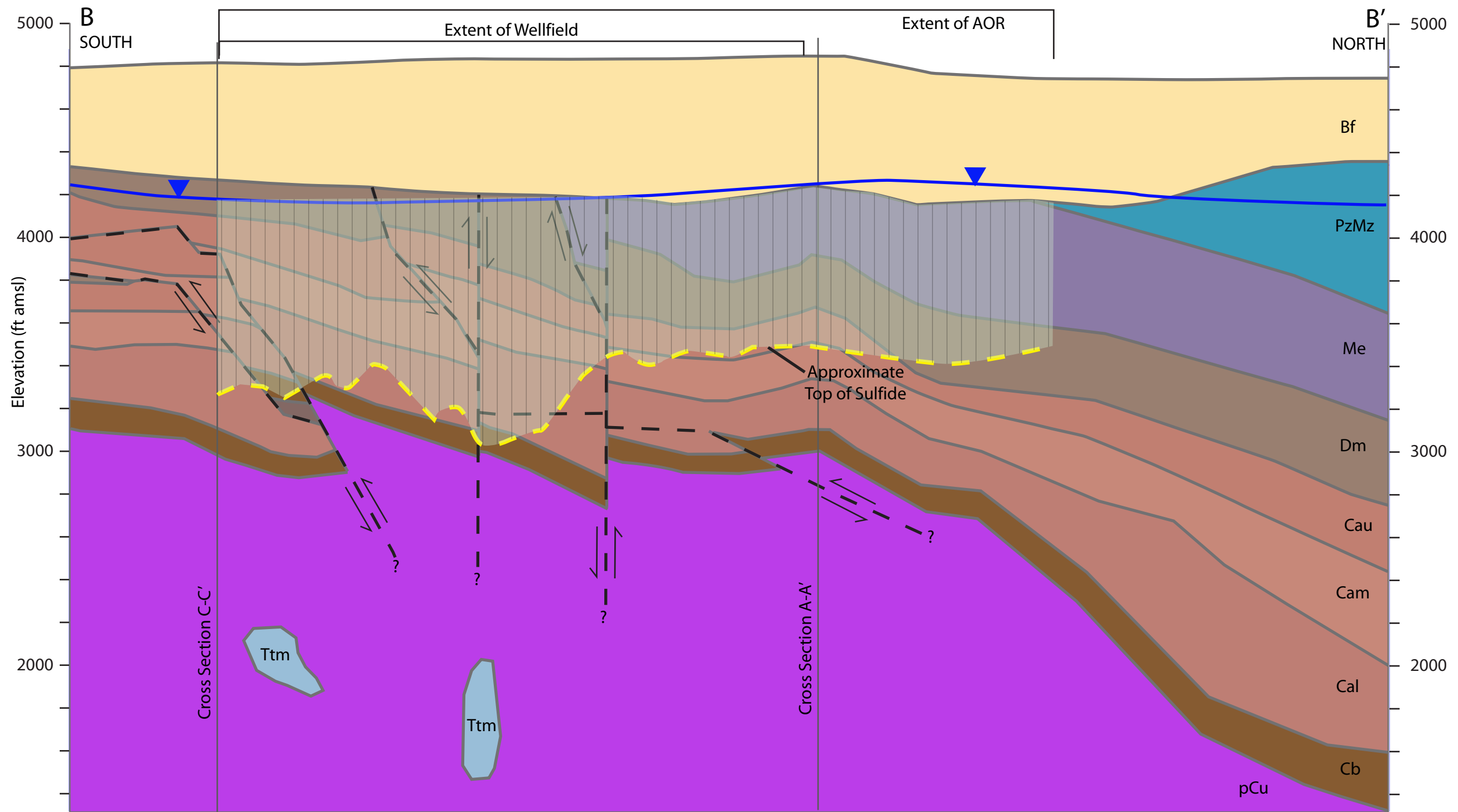


Source: Excelsior Geologic Model

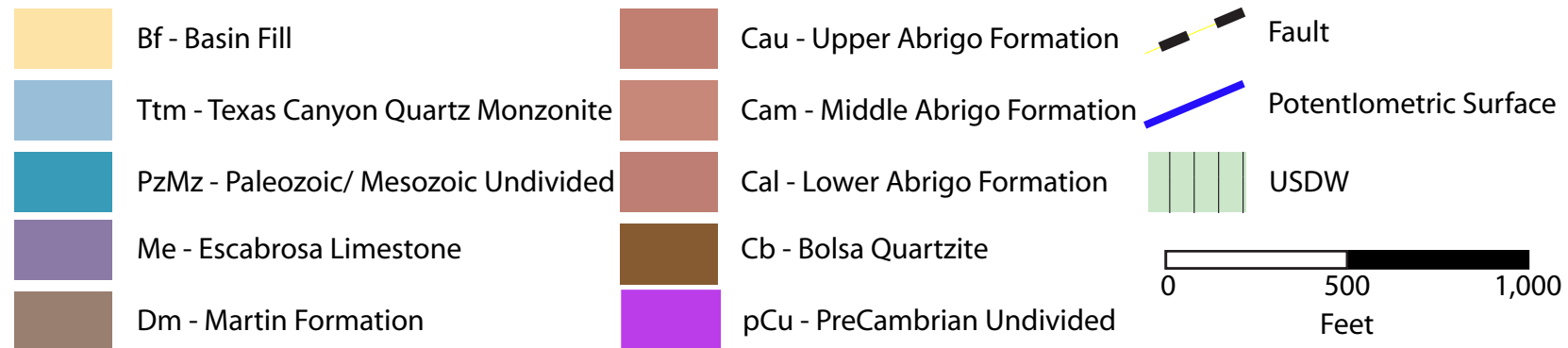
 Bf - Basin Fill	 Cau - Upper Abrigo Formation	 pCu - PreCambrian Undivided
 PzMz - Paleozoic/ Mesozoic Undivided	 Cam - Middle Abrigo Formation	 Fault
 Me - Escabrosa Limestone	 Cal - Lower Abrigo Formation	 Potentiometric Surface
 Dm - Martin Formation	 Cb - Bolsa Quartzite	 USDW

0 500 1,000
Feet

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	FIGURE D-3 Geologic Cross Section A - A'	



Source: Excelsior Geologic Model

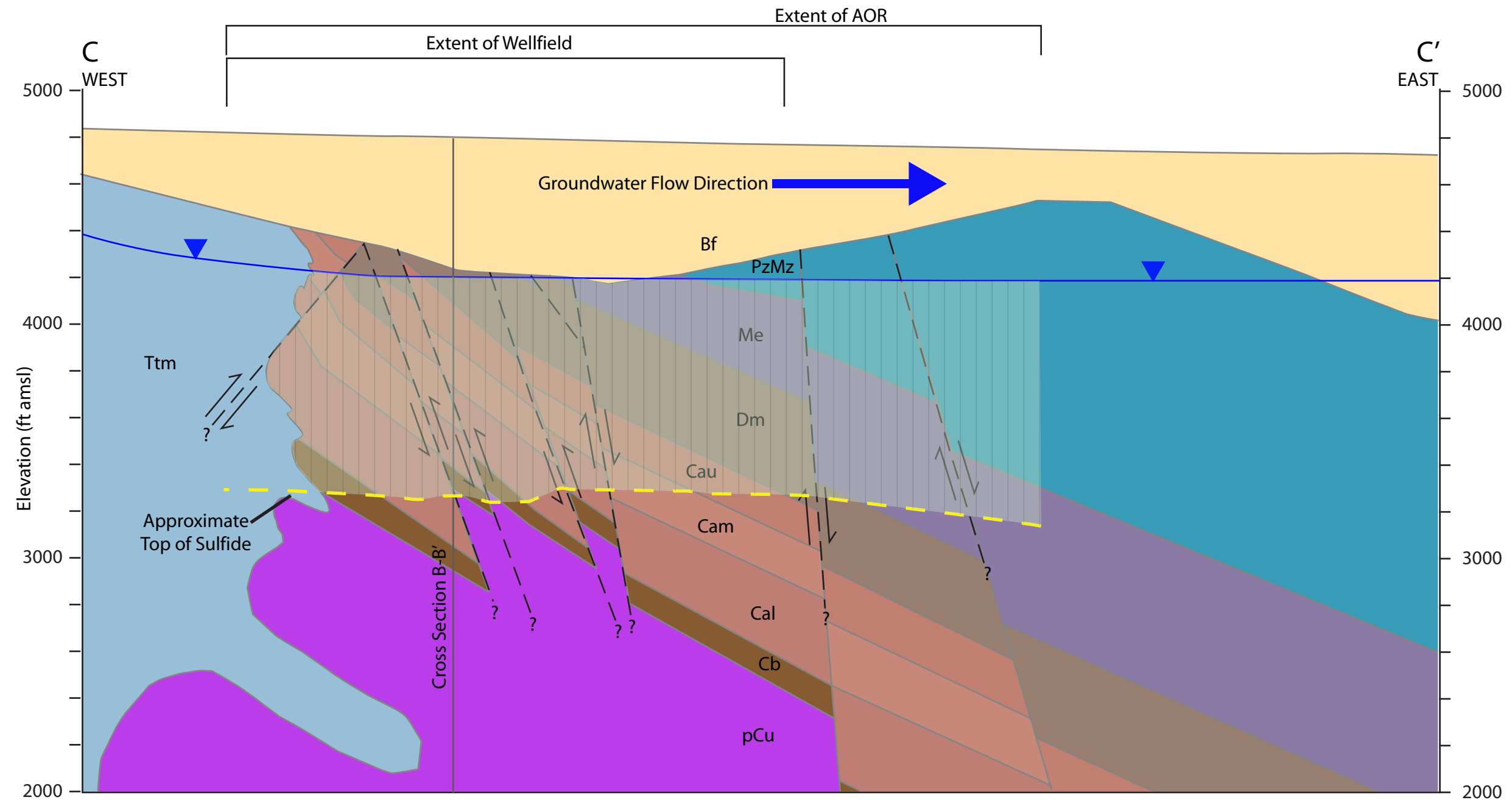


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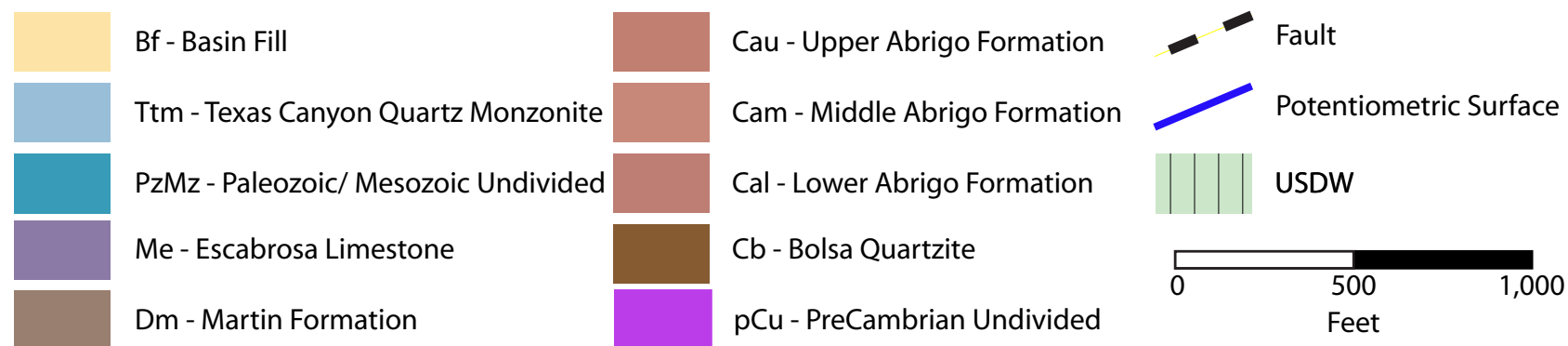
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FIGURE D-4
Geologic Cross Section B-B'



Source: Excelsior Geologic Model



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FIGURE D-5
Geologic Cross Section C - C'